## Patent Claims

1. An optical retardation film for use in a liquid crystal display (LCD) device, characterized in that said film is positioned inside the switchable liquid crystal cell of said LCD.

2. A liquid crystal display (LCD) comprising a liquid crystal (LC) cell formed by two plane parallel substrates at least one of which is transparent to incident light, a liquid crystal medium which is present between the two substrates, and at least one optical retardation film, characterized in that at least one of said optical retardation films is positioned between the two substrates of the LC cell.

3. An LCD according to claim 2, further comprising a colour filter array provided on one of said substrates, characterized in that said at least one optical retardation film is positioned between the colour filter and the LC medium.

4. An LCD comprising

1) a liquid crystal (LC) cell comprising the following elements, starting from the edges to the centre of the cell in the sequence listed below

a) a first and a second substrate plane (11a, 11b) parallel to each other, at least one of which is transparent to incident light,

b) optionally an array of nonlinear elements (12) on one of said substrates which can be used to individually switch individual pixels of said LC cell, preferably active elements like transistors, very preferably TFTs,

c) optionally a colour filter array (13) provided on one of said substrates, preferably on the substrate opposite to that carrying the array of nonlinear elements, said colour filter optionally being covered by a planarisation layer (14),

d) a first electrode layer (15a or 15b) provided on the inside of said first substrate,

e) optionally a second electrode layer (15a or 15b) provided on the inside of said second substrate,

f) optionally first and second alignment layers (16a or 16b) provided on said first and second electrodes,

g) an LC medium (17) that is switchable between at least two different states by application of an electric field,

2) a first linear polariser on one side of the LC cell,

3) optionally a second linear polariser on the side of the LC cell opposite to that of the first linear polariser,

4) at least one optical retardation film (18),

characterized in that at least one of said optical retardation films is positioned between the first and second substrate (11a, 11b) of the LC cell.

5. An LCD according to claim 4, characterized in that it comprises a colour filter array (13) being covered by a planarisation layer (14), and said at least one optical retardation film (18) is positioned on the side of the planarisation layer facing away from the colour filter array (13).

6. An LCD according to claim 4, characterized in that it comprises a colour filter array (13), and said at least one optical retardation film (18) is positioned on the side of the colour filter array facing away from the nearest substrate and is optionally covered by a planarisation layer (14).

7. An LCD according to claim 5 or 6, characterized in that the optical retardation film (18) is directly prepared on the colour filter array (13) or on the planarisation layer (14).

8. An optical retardation film or LCD according to at least one of claims 1 to 7, characterized in that the optical retardation film comprises polymerised or crosslinked LC material.

9. An optical retardation film or LCD according to claim 8, characterized in that the optical retardation film is prepared from a polymerisable LC material comprising one or more polymerisable mesogenic or LC monomers.

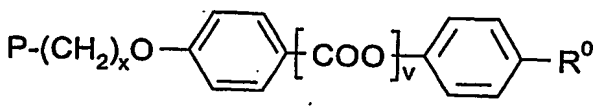
10. An optical retardation film or LCD according to claim 9, characterized in that the polymerisable LC material comprises

- 5 - 70 % by weight of one or more direactive achiral mesogenic compounds,
- 30 - 95 % preferably 50 - 75 % by weight of one or more monoreactive achiral mesogenic compounds,
- 0 to 10 % by weight of one or more photoinitiators.

11. An optical retardation film or LCD according to claim 9 or 10, characterized in that LC material comprises at least one chiral compound selected from non-polymerisable chiral compounds, polymerisable chiral non-mesogenic compounds and polymerisable chiral mesogenic compounds.

12. An optical retardation film or LCD according to at least one of claims 9 to 11, characterized in that the LC material comprises at least one compound selected from photoisomerisable compounds and phototunable cchiral compounds.

13. An optical retardation film or LCD according to at least one of claims 9 to 12, characterized in that the LC material comprises one or more compounds selected from the following formulae

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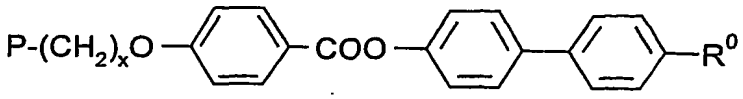

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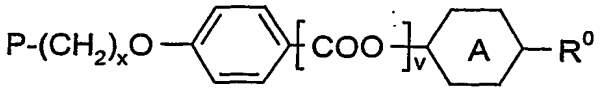

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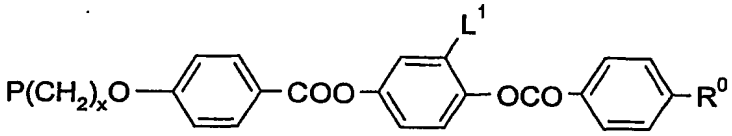

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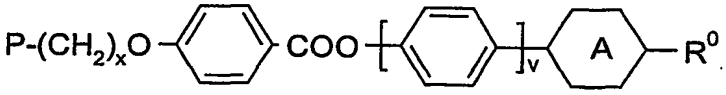

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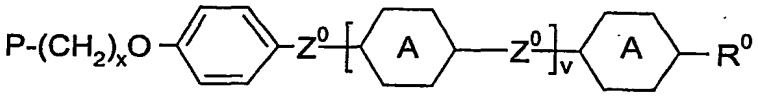

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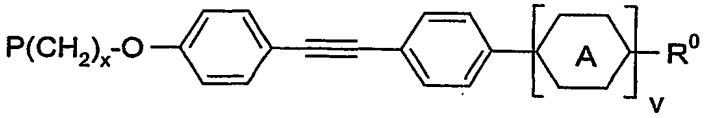

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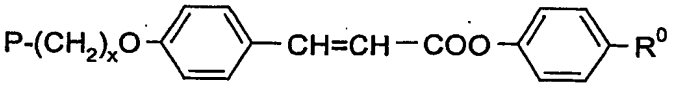

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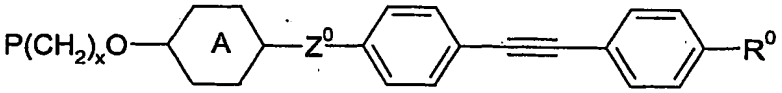

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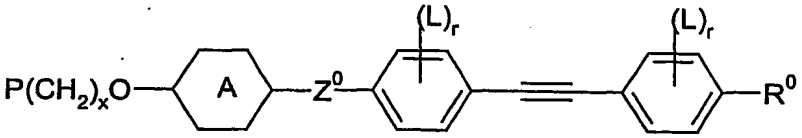

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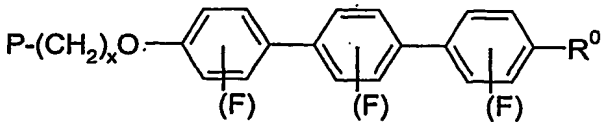

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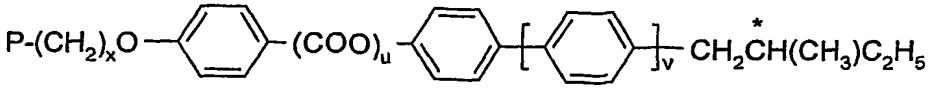

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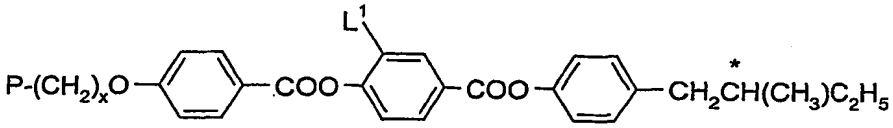

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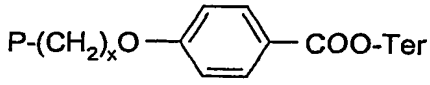

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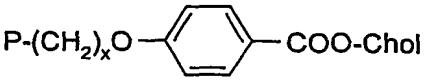

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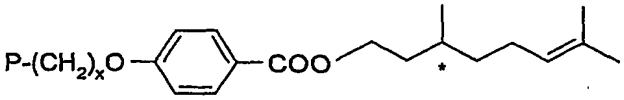

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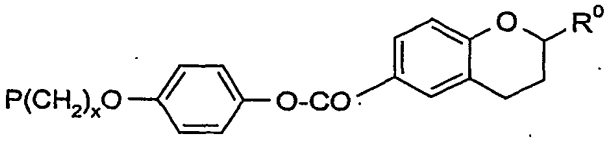

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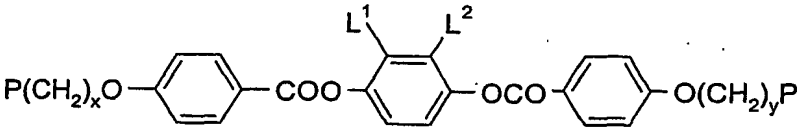

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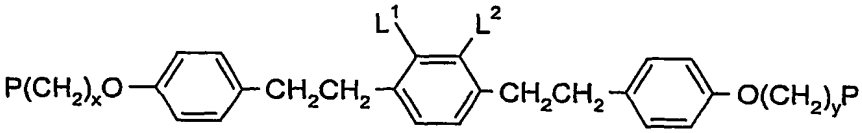

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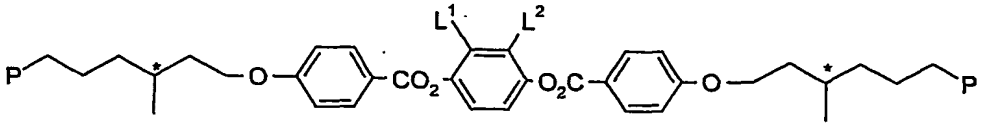

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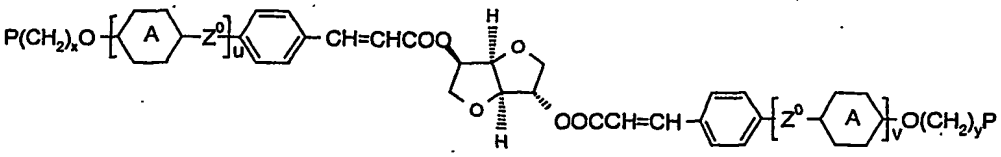

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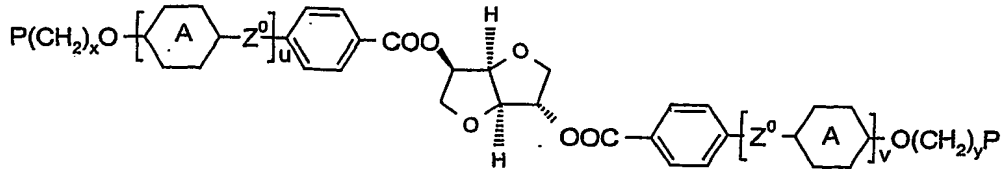

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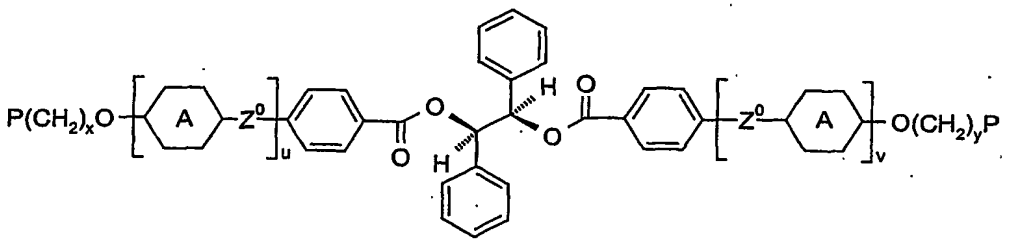

(R23)

wherein

| | |
|---|---|
| P | is a polymerisable group, |
| x and y | are identical or different integers from 1 to 12 , |
| A | is 1,4-phenylene that is optionally mono-, di- or trisubstituted by $L^1$, or 1,4-cyclohexylene, |
| u and v | are independently of each other 0 or 1, |
| $Z^0$ | is -COO-, -OCO-, $-CH_2CH_2-$, -CH=CH-, -C≡C- or a single bond, |
| $R^0$ | is a polar group selected from F, Cl, CN, $NO_2$, OH, $OCH_3$, OCN, SCN, an optionally fluorinated alkycarbonyl, alkoxycarbonyl, alkylcarbonyloxy or alkoxycarbonyloxy group with up to 4 C atoms or a mono- oligo- or polyfluorinated alkyl or alkoxy group with 1 to 4 C atoms, or an unpolar group selected from optionally halogenated alkyl, alkoxy, alkycarbonyl, alkoxycarbonyl, alkylcarbonyloxy or alkoxycarbonyloxy group with 1 or more C atoms which is not one of the polar groups above, |

Ter is a terpenoid radical,

Chol is a cholesteryl group,

L, $L^1$ and $L^2$ are independently of each other H, F, Cl, CN or an optionally halogenated alkyl, alkoxy, alkylcarbonyl, alkylcarbonyloxy, alkoxycarbonyl or alkoxycarbonyloxy group with 1 to 7 C atoms, and r is 0, 1, 2, 3 or 4

ans wherein the phenyl rings are optionally substituted by 1, 2, 3 or 4 groups L.

14. An optical retardation film or LCD according to at least one of claims 1 to 13, characterized in that the optical retardation film is a planar, homeotropic, tilted, splayed, twisted or cholesteric film.

15. An optical retardation film or LCD according to at least one of claims 1 to 14, characterized in that the optical retardation film has a twisted or cholesteric structure with a pitch of less than 250 nm.

16. An optical retardation film or LCD according to at least one of claims 1 to 15, characterized in that the optical retardation film is a positive or negative A, O or C plate.

17. An optical retardation film or LCD according to at least one of claims 1 to 16, characterized in that the optical retardation film is a quarter wave retardation film.

18. An optical retardation film or LCD according to at least one of claims 1 to 17, characterized in that the optical retardation film is an optically biaxial film.

19. An optical retardation film or LCD according to at least one of claims 1 to 18, characterized in that the optical retardation film is a biaxial film having a cholesteric structure which has optically biaxial negative C symmetry with $n_x \neq n_y \neq n_z$ and $n_x$, $n_y > n_z$, wherein $n_x$ and $n_y$ are the principal refractive indices in orthogonal directions in the film plane and $n_z$ is the principal refractive index perpendicular to the film plane.

20. An optical retardation film or LCD according to at least one of claims 1 to 19, characterized in that the optical retardation film has a pattern comprising at least two regions having different orientation and/or different retardation.

21. An LCD according to at least one of claims 2 to 19, characterized in that it is a display of the TN, HTN, STN, AMD-TN, IPS, DAP, VA, ECB, CSH, VAN, VAC, MVA, PVA, OCB, R-OCB, HAN, pi-cell, SSCT, isotropic or new mode.